

STATE OF CALIFORNIA  
STATE WATER RESOURCES CONTROL BOARD

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In the Matter of the Petition of )  
CITY OF SACRAMENTO )  
For Review of Failure to Act by )  
the California Regional Water )  
Quality Control Board, Central )  
Valley Region, with Respect to )  
Discharges of Rice Herbicides. )  
Our File No. A-415. )

ORDER NO. WQ 86-3

BY THE BOARD:

The City of Sacramento (City), which draws water from the Sacramento River for domestic and municipal use, contends that discharges of the herbicide "Bolero" from rice growing areas of the Sacramento Valley have an unreasonable adverse effect on the quality of its water supply. The City further contends that the Regional Water Quality Control Board, Central Valley Region (Regional Board) on October 25, 1985, failed to take effective action consistent with Regional Board Resolution No. 84-044 to protect the City's water supply from degradation by Bolero. On November 12, 1985, the City filed this petition asking the State Water Resources Control Board (State Board) to take whatever actions are necessary to prevent Bolero residues from exceeding objectionable levels at the City's water supply intake.

I. BACKGROUND

A. Overview

The Sacramento Valley, because of favorable terrain and adequate supplies of good quality water, supports over 90 percent of the rice grown in California. Rice herbicides, such as thiodencard (marketed by Chevron Chemical

Company under the trade name "Bolero"), are used to prevent the growth of water grasses which, if left uncontrolled, would substantially reduce rice crop yields. Rice herbicide use has increased drastically since 1979, in part due to the introduction of higher yield, short-stem rice varieties which require more chemical weed control. Rice herbicides are typically applied to flooded rice fields during May and June. After use, rice-field effluent is often discharged to large surface drains which eventually reach the Sacramento River. During the rice growing season, up to one-third of the Sacramento River flow between Knights Landing and the City of Sacramento consists of rice field drain water. As use of products such as Bolero has increased, so has concern over the water quality impacts of such use (State Board Special Project Report No. 84-4sp, April 1984). The discharge of drainage water containing rice herbicide residues has been reported to cause adverse effects on water quality in the Sacramento River and its tributaries. Specifically, trace concentrations of Bolero in the Sacramento River have been implicated in causing a bitter taste in drinking water produced by the City of Sacramento's Water Treatment Plant. This Plant furnishes domestic water to some 100,000 people. Apparently the taste problem is subject to chemical treatment, including the use of potassium permanganate.

The record shows that three rice-growing areas in the Sacramento Valley have been largely responsible for the discharges of Bolero which have affected water quality at the City's intake. These areas are shown on the map attached to this Order as Appendix 1. The largest area is served by the Colusa Basin Drain (A). Together with Reclamation District 108(B) these areas account for most of the rice-growing areas in Glenn and Colusa Counties (more than 35 percent of California's rice-growing area). Areas in the Sutter by-pass and

other areas on the east side of the Sacramento River, including those draining into Sacramento Slough (C) may account for an additional 12 - 15 percent of California's rice growing area. Other rice-growing areas on the east side of the Sacramento River, and along the Feather River, have not discharged their tail-waters into the Sacramento River above the City, and have not been implicated in the water quality degradation which is the subject of this Order.

On January 26, 1982, the State Board issued a Pesticide Guidance Report based on the premise that agricultural production and water quality protection can be compatible goals. This document recognizes the status of the Department of Food and Agriculture (Department) as lead agency regarding the registration and use of pesticides and herbicides. However, it also indicates that the State Board and Regional Boards must be prepared to act to prevent adverse impacts on water quality that might result from agricultural practices. Consistent with this premise of shared responsibility, the Regional Board has looked to the Department to be the lead agency to prevent rice herbicides from adversely affecting beneficial uses of the state's waters. The Regional Board in Resolution No. 84-044, took the following actions:

1. Found that discharges of herbicides from rice fields caused violations of water quality objectives pertaining to taste and odor, toxicity, and pesticides.

2. Found that secondary drinking water standards for Bolero recommended by the Department of Health Services (1 part per billion)<sup>1</sup> to be an appropriate guideline to protect beneficial uses.

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<sup>1</sup> This is the same as a concentration of 1 microgram per liter of water (1 ug/l).

3. Requested the Department to exercise its authority to assure that the use of rice herbicides does not result in damage to beneficial uses of state waters.

4. Urged the Department to establish an advisory committee to assist it in the continued development of a program to prevent off-site movement of rice herbicides from California rice fields.

In fact, since 1984, the Department has exercised its regulatory powers in an attempt to minimize the discharge of rice herbicide residues to the Sacramento River and its tributaries. The central regulatory method chosen by the Department has been to limit Bolero sales and to thereby limit Bolero usage. A variation of this method was used in the Department's 1984 and 1985 plans. The proposed 1986 plan also relies heavily on sales restrictions. A review of the record indicates that each of these plans has placed more restrictions on the use of Bolero. It is also apparent that, despite implementation of the 1985 plan, violations of the Regional Board's water quality control plan for the Central Valley Region (Basin Plan) occurred. The petitioner, contending that the 1986 plan could lead to further violations, first asked the Regional Board and now asks us to take direct regulatory action to prevent further violations. The Department, on the other hand, feels that its proposed regulatory program for 1986 will adequately protect state waters.

#### B. Water Quality Objectives

The Basin Plan contains water quality objectives for the protection of beneficial uses and the prevention of nuisance, as required by Section 13241 of the Water Code and Section 303 of the Clean Water Act (33 U.S.C. Section 1313). In accordance with the policies set forth in Section 13000 of

the Water Code these objectives should promote attainment of the highest water quality which is reasonable and "protect the quality of waters in the state from degradation...." The Basin Plan does not contain specific numerical objectives for Bolero, or other rice herbicides. However, it does provide that "the total concentrations of all pesticides shall not exceed 0.6 [ppb]" downstream of Freeport.<sup>2</sup> The Basin Plan also contains narrative objectives regarding "Chemical Constituents", "Pesticides", and "Tastes and Odors". Each provides that the constituents of concern shall not be present in concentrations which adversely affect beneficial uses. (Basin Plan, Table 4-1, attached to this Order as Appendix 2.)

The Department of Health Services developed "Recommended Drinking Water Interim Action Levels" for Bolero in 1984. The secondary action level for Bolero (intended to prevent objectionable tastes in drinking water) was set at 1 ppb. The primary action level (intended to protect human health) is 10 ppb. The action level for protection of aquatic resources, based on recommendations of the Department of Fish and Game (DFG) is 24 ppb. (A tabular summary of recommended action levels for rice herbicides is attached to this Order as Appendix 3.)

In Resolution No. 84-044, the Regional Board recognized these recommended action levels as appropriate guidelines for the protection of beneficial uses, and as providing a proper basis for regulatory action.

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<sup>2</sup> Freeport is less than 15 miles below the City's intake tower at the confluence of the Sacramento and American Rivers, and a peak concentration of Bolero in excess of 1 ppb at the intake would not be significantly attenuated at Freeport.

C. Department of Food and Agriculture Regulation

Bolero, like other herbicides, is regulated by the Department under Division 7 of the Food and Agricultural Code (commencing with Section 12501). The Department has adopted a program for the use of rice herbicides intended to prevent off-site movement of herbicide residues. Pursuant to Section 13247 of the Water Code<sup>3</sup> the Department's program must be designed to ensure attainment of applicable water quality objectives contained in the Basin Plan. Despite past efforts to control discharges of Bolero in recognition of its affect on drinking water supplies, the concentration of Bolero exceeded the 1 ppb secondary action level at the City's intake for approximately 20 days in 1985, with a peak concentration of nearly 4 ppb at the height of the rice-growing season.

A rice herbicide working group consisting of representatives of the Department, the Regional Board, the State Board, the Department of Fish and Game (DFG), the Agricultural Commissioners of Sacramento Valley Counties, the City, the University of California (Extension Service), the Rice Research Board, and various rice-industry groups (e.g. the Sacramento Valley Water Quality Committee, reclamation districts, rice growers, etc.) attributed the 1985 problems to increased use of Bolero in areas discharging to the Sacramento River, especially from the Colusa Basin Drain; and to reduced flows in the River (which meant that drain flows constituted a larger proportion of the total flow than is usually the case).

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<sup>3</sup> Section 13247 of the Water Code provides that:

"State offices, departments and boards, in carrying out activities which may affect water quality, shall comply with water quality control plans approved or adopted by the state board unless otherwise directed or authorized by statute...."

The Department's 1986 proposed rice herbicide regulatory program as it relates to Bolero, can be summarized as follows:

1. Bolero may be used without restriction in specific geographic regions that do not discharge into the Sacramento River.

2. Bolero may be used without restriction on land from which tailwater will not discharge into state waters for at least 14 days following the last application of Bolero to the affected acreage.

3. Bolero may be used within drainage basins that discharge into the Sacramento River only as follows:

a. Only 20,000 acres total may receive Bolero.

b. Supplies will be allocated to counties according to 1985 use.

c. Tail-water must be held at least six days.

d. Tail-water released prior to 14 days following application must be released at a volume not to exceed two inches of water over a standard rice-box weir.

4. County Agricultural Commissioners may approve Bolero use on a case-by-case basis where growers use untreated soil surfaces to help decrease Bolero residues in tailwater.

The 1986 plan was developed after consideration of the recommendations of the rice herbicide working group. This group had reviewed the results of the Department's 1985 rice herbicide regulatory plan and made recommendations to the Department regarding modifications for 1986.

The 1986 plan differs from the recommendations of the rice herbicide working group in the following material respect: the task force had recommended a 100,000 acre limit on total use and had recommended that use of the more lenient six-day holding restriction be limited to 10,000 (rather than 20,000) acres.

#### D. Regional Board Consideration

On October 2, 1985, the City of Sacramento (City) petitioned the Regional Board to take regulatory and enforcement action adequate to prevent concentrations of Bolero from exceeding the secondary action level in order to protect the beneficial use of the Sacramento River as a municipal water supply. The City contends that the Department's rice herbicide management plan entitled: "1986 Program to Prevent Off-Site Movement of Rice Herbicides from California Rice Fields" is inadequate to prevent concentrations of Bolero in the Sacramento River from exceeding the secondary level at the City's intake.

On October 25, 1985, the Regional Board considered the 1986 regulatory program for rice herbicides proposed by the Department and concerns expressed by the City. The Regional Board sent recommended modifications to the Department on November 1985. The Regional Board has proposed two substantive modifications to the Department draft 1986 plan. First, it recommends that use of Bolero in situations where the tail-water is only subject to the six-day holding restriction be allocated on an emergency basis to no more than 20,000 acres. Secondly, the Regional Board recommended that total Bolero use be limited to four million pounds (enough to treat 100,000 acres) in the Sacramento Valley until the effectiveness of the 14-day holding time and soil treatment process can be established. The Department, in its response to the petition, did not indicate whether it would incorporate the Regional Board's recommendations into the 1986 plan but did state that it considered those recommendations to "collectively approximate" the Department's control program. The Department contends that the 1986 plan will adequately protect state waters.

On November 12, 1985, the City petitioned the State Board to take regulatory and enforcement actions to reduce or totally eliminate the discharge of rice herbicides, particularly Bolero, into the Sacramento River above the intake of the City's water treatment plant. The petition contends that the Regional Board rejected the City's petition for regulatory and enforcement action at the Regional Board meeting on October 25, 1985.

The City contends that exceeding the 1.0 ppb secondary action level for Bolero constitutes a violation of the "standards" included in the Water Quality Control Plan (for the Sacramento River Basins 5A and 5B), and that the Regional Board's failure to take appropriate regulatory and enforcement action to prevent adverse effects to beneficial uses of Sacramento River water was improper.

## II. CONTENTIONS AND FINDINGS

Contention: The City contends that CDFA's 1986 regulatory program for rice herbicides will not "insure that water quality standards will be protected" in accordance with Regional Board Resolution No. 84-044 or the Basin Plan. Analysis of this contention involves two major issues:

1. Issue: What water quality objectives will ensure protection of the City's beneficial use of the Sacramento River as a source of municipal supply?

Finding: Municipal supply (which includes drinking water) is an identified beneficial use of the Sacramento River. The Regional Board has recognized the secondary action levels recommended by DHS as "appropriate guidelines" for protection of the Sacramento River as a source of drinking water. The recommended action level for thiodencard (Bolero) in drinking water

is an interim water quality guideline developed by the Community Toxicology Unit of DHS during 1984 at the request of the Department. The DHS staff report entitled "Thiobencarb (Toxicologic Evaluation and Recommended Drinking Water Interim Action Levels)" concluded that:

"...the data indicate that levels exceeding 1 ppb of thiobencarb may be objectionable to consumers. Based on this information, the recommended action level for thiobencarb is 1 ppb. Because the objectionable taste is created after water-containing thiobencarb has undergone standard water treatment (i.e., chlorination), the action level should be applied in the Sacramento River at the water intake...."

In the absence of specific numeric objectives for Bolero in the Regional Board's Basin Plan, these "action levels" may be used by the Regional Board to determine whether or not observed concentrations of Bolero are consistent with the narrative objectives for "Chemical Constituents", "Pesticides", and "Tastes and Odors" (Appendix 2).

2. Issue: Will the Department's 1986 regulatory program for rice herbicides ensure attainment of applicable water quality objectives, as measured by secondary action levels?

Finding: Assuming that Sacramento River flows during the 1986 rice-growing season are similar to flows in 1985,<sup>4</sup> the proposed program of the Department will not prevent concentrations of Bolero from exceeding 1 ppb at the City's intake. Since it has been determined that concentrations of Bolero

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<sup>4</sup> This assumption is based on the fact that the latest 1986 projections for May and June flows in the Sacramento River (at Freeport) are similar to the flows measured in 1985. The Board takes administrative notice of these projections by the Department of Water Resources (DWR) as set forth in a letter dated December 27, 1985 from L. K. Gage, Chief of the Scheduling Section, Division of Operations and Management, (DWR) to Ray Collison, County of Sacramento.

in excess of 1 ppb violate water quality objectives for municipal supply in the Basin Plan, the proposed program does not ensure compliance with the Basin Plan and does not prevent impairment of beneficial uses of the Sacramento River as a source of municipal water supply.

We have reviewed the draft 1986 plan and agree with the Department and Regional Board that it should substantially reduce Bolero discharges to the River from what occurred in 1985. This reduction should occur mainly because of the 20,000 acre sales limitation on treatments that require only a six-day field holding period. In this regard it should be noted that Bolero was used on over 60,000 acres of land in 1985 that was only subject to the six day holding period. Additionally, the slow release requirement may lead to additional reductions in Bolero discharges. However, it appears that these reductions will not be enough to maintain Bolero levels below the DHS secondary action level of 1 part per billion (ppb). The peak concentrations of Bolero during 1985 was 3.7 ppb measured at the City's water intake, while total Bolero mass emission from the three primary drainages was estimated to be 4,300 pounds. Assuming that 1986 will have similar river dilution capacity as 1985, this yields a target level of approximately 1,200 pounds of Bolero to maintain the peak concentration of Bolero below 1 ppb during 1986. Use of Bolero on 20,000 acres of the areas shown on the map in Appendix 1 would result in discharges of approximately 1,360 lbs. of Bolero. Furthermore, use of Bolero on additional acreage in the "non-exempt" areas under the 14-day tail-water management provisions of the Department's program would result in additional

discharges of Bolero.<sup>5</sup> The total potential discharge of Bolero if the proposed 1986 plan is completed is estimated to be 2,040 pounds. In conclusion, although the Department's plan would substantially reduce Bolero discharges in 1986, the contention by the City that the plan will not prevent concentrations of Bolero from exceeding 1 ppb appears to be accurate.

### III. CONCLUSION

1. The Department of Food and Agriculture is required, pursuant to Water Code §13247 to regulate the use of Bolero, and other rice herbicides, in a manner which will ensure compliance with water quality objectives in Basin Plans approved by the State Board, and which will prevent herbicide residues from degrading water quality to the extent that beneficial uses of affected waters are impaired. The 1986 rice herbicide program adopted by the Department of Food and Agriculture should be modified to prevent Bolero concentrations from exceeding 1 ppb at the City's intake during the 1986 rice growing season. This could be accomplished by restricting Bolero applications to 10,000 acres of the "non-exempt" areas shown in the map attached to this Order as Appendix 1; provided that the Director of the Department should have discretion to authorize Bolero use on up to 10,000 additional acres of the "non-exempt" areas if projected flow levels in the Sacramento River, or implementation of other mitigating factors (such as effective tail-water management plans), will

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<sup>5</sup> Discharges from areas which practice tail-water management contain concentrations of Bolero which are as much as 75 percent less than in discharges from areas where tail waters are released after only six days. (Staff Report, pages 39-43.) However, despite the reduced level of Bolero residues discharged, such discharges will probably contribute to the concentration of Bolero measure at the City's intake, and should not be disregarded in projecting anticipated waste loads.

ensure that such additional use will not result in concentrations of Bolero in the Sacramento River which exceed secondary action levels at the City's intake. Any such discretionary additional allocation based on projected river flows should not be made before accurate spring flow projections are available.<sup>6</sup>

2. If the Department fails to modify the 1986 regulatory program for rice herbicides as prescribed in this Order, the Regional Board should be prepared to take direct action to protect water in the Sacramento River during the 1987 rice-growing season. In this event the Regional Board should, prior to the 1987 rice-growing season, take appropriate action to control discharges of Bolero, and other rice herbicides, in amounts which will cause concentrations of Bolero, or other rice herbicides, to exceed secondary action levels in the Sacramento River. The Regional Board could adopt specific numeric water-quality objectives for Bolero, and other herbicides used by rice growers in the Sacramento Valley. Under this approach, the Regional Board would have to adopt specific numeric objectives which would ensure protection of all identified beneficial uses including municipal supply. The 1 ppb secondary action level recommended for Bolero by DHS will ensure that the objectionable taste associated with higher concentrations of Bolero will not impair the use of the Sacramento River as a source of municipal water supplies.

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<sup>6</sup> State Water Resources Control Board takes administrative notice of the fact that flow projections based on winter precipitation are made and updated by the Department of Water Resources.

IV. ORDER

IT IS HEREBY ORDERED THAT:

1. The Executive Director of the State Board shall transmit this Order to the Director of the California Department of Food and Agriculture, together with a copy of the staff report prepared in this matter, which both conclude that the proposed 1986 regulatory program for rice herbicides be modified to ensure compliance with the Basin Plan as required by Section 13247 of the Water Code.

2. If the Department fails to modify the 1986 regulatory program according to this Order, the Regional Board is directed to take action consistent with the conclusions of this Order. Such action shall be accompanied by the development of appropriate criteria to implement a waiver policy for discharges pursuant to regional management plans which are not inconsistent with the Basin Plan and this Order. This action shall be adopted in sufficient time to be effective before the 1987 rice-growing season.

CERTIFICATION

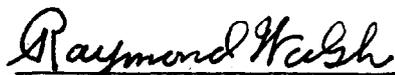
The undersigned, Executive Director of the State Water Resources Control Board, does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on February 20, 1986.

Aye: Raymond V. Stone  
Darlene E. Ruiz  
E. H. Finster  
Eliseo M. Samaniego  
Danny Walsh

No: None

Absent: None

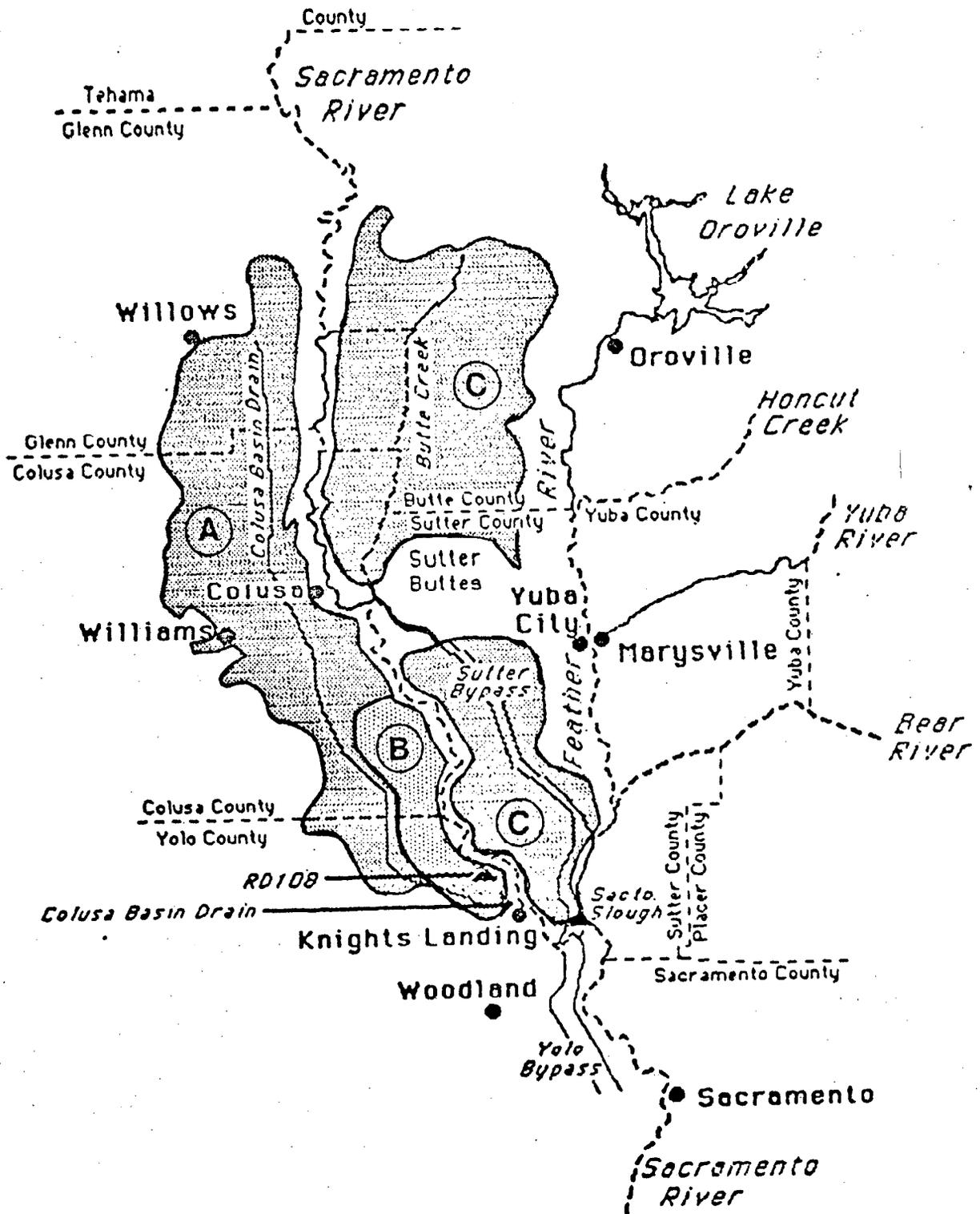
Abstain: None

  
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Raymond Walsh  
Interim Executive Director

APPENDIX 1.

MAJOR RICE DRAINAGE BASINS DISCHARGING TO THE SACRAMENTO RIVER

(SOURCE: DFA DRAFT REPORT).



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## APPENDIX 2

### WATER QUALITY OBJECTIVES FOR INLAND SURFACE WATERS

Source: Table 4-1, "Water Quality Control Plan, Central Valley Region (5)

#### Chemical Constituents

Waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses. Water designated for use as domestic or municipal supply (MUN1) shall not contain concentrations of chemical constituents in excess of the limits specified in California Administrative Code, Title 17, Chapter 5, Subchapter 1, Group 1, Article 4, Section 7019, Tables 2, 3, and 4. The limits described therein will be reviewed on a case-by-case basis in order to assure protection of beneficial uses other than MUN, as appropriate. To the extent of any conflict with the above, the more stringent objective applies.

#### Pesticides

No individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses. There shall be no increase in pesticide concentrations found in bottom sediments or aquatic life that adversely affects beneficial uses. Pesticides are defined as any substance or mixture of substances used to control objectionable insects, weeds, rodents, fungi, or other forms of plant or animal life.

Total identifiable chlorinated hydrocarbon pesticides shall not be present at concentrations detectable within the accuracy of analytical methods prescribed in Standard Methods for the Examination of Water and Wastewater, latest edition, or other equivalent methods approved by the Executive Officer.

#### Tastes and Odors

Waters shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to domestic or municipal water supplies or to fish flesh or other edible products of aquatic origin--that cause nuisance, or otherwise adversely affect beneficial uses.

#### Toxicity

All waters shall be maintained free of toxic substances in concentrations that are toxic to or that produce detrimental physiological responses in human, plant, animal, or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration, or other appropriate methods as specified by the Regional Board.

APPENDIX 3

INTERIM RECOMMENDED ACTION LEVELS AND  
GUIDELINES FOR ORDAM AND BOLERO

	<u>Ordram</u> <u>(ug/l molinate)</u>	<u>Bolero</u> <u>(ug/l thiobencarb)</u>
<u>I. DHS Action Levels</u>		
For the protection of human health (primary action level for drinking water)	20	10
To prevent objectionable tastes in drinking water (secondary action level in raw water)	--	1.0
<u>II. DFG Guidelines</u>		
For the protection of aquatic resources in the Sacramento River and its tributaries	90	24